Log No. <u>182</u>

TAG Revision 7/16/21

STATE BUILDING CODE COUNCIL

2021 Washington State Energy Code Development **Standard Energy Code Proposal Form**

Code being amended:	Commercial Provisions	Residential Provisions
Code Section # C404.7. 1	1, C404.7.1.1, C404.7.1.2	
Brief Description:		

In service water heating systems, circulation pumps with electronically commutated motors (ECM) offer energy savings compared to circulation pumps with standard induction motors. This proposal requires ECM motors for all SWH circulation pumps.

This proposal incorporates guidance from SBCC Official Opinion #17-08, which states that hot water demand may be determined based upon usage patterns.

In Section C404.7.1, the phrase "...that can be set to..." is another version of the phrase "capable of." This proposal incorporates the requirement for controls to be "configured to" perform a specific function versus just being capable of said function, which is a consistent update for controls requirements throughout the code.

Proposed code change text: (Copy the existing text from the Integrated Draft, linked above, and then use <u>underline</u> for new text and strikeout for text to be deleted.)

C404.7.1 Circulation systems. Heated-water circulation systems shall be provided with a circulation pump. The pump shall have an electronically commutated motor with a means of adjusting motor speed for system balancing. The system return pipe shall be a dedicated return pipe. Gravity and thermo-syphon circulation systems shall be are prohibited. Controls shall start the circulation pump based on the identification of a demand for hot water within the occupancy.

C404.7.1.1 Single riser systems. Where the circulation system serves only a single domestic hot water riser or zone, the following controls shall be provided:

- 1. Controls to shall be configured to automatically turn off the pump when the water in the circulation loop is at the design supply temperature and shall not turn the pump back on until the temperature is a minimum of 10°F lower than the design supply temperature. or other controls that can be set to switch off the pump during unoccupied hours when hot water is not required.
- 2. Controls shall be equipped with a manual switch or other controls method that can be used to turn off the circulation pump during extended periods when hot water is not required.

Exception: Subject to the approval of the code official, for building occupancies with continual hot water demand during occupied hours, time switches or other controls are permitted in lieu of temperature maintenance controls provided the controls are configured to automatically turn off the circulation pump during unoccupied hours when hot water is not required.

C404.7.1.2 Multiple riser systems. Where the circulation system serves multiple domestic hot water risers or piping zones, the following controls shall be provided:

1. <u>C</u>ontrols shall be <u>provided such that they can be set to switch off the configured to automatically turn off the circulation pump during extended periods when hot water is not required.</u>

2. System shall include a means for balancing the flow rate through each individual hot water supply riser or piping zone. Purpose of code change: Improve energy performance of service water heating circulation systems by requiring higher efficiency pump motors. Your amendment must meet one of the following criteria. Select at least one: Addresses a critical life/safety need. Consistency with state or federal regulations. The amendment clarifies the intent or application of Addresses a unique character of the state. the code. Corrects errors and omissions. Addresses a specific state policy or statute. (Note that energy conservation is a state policy) Check the building types that would be impacted by your code change: Multi-family 4 + stories Institutional Single family/duplex/townhome Commercial / Retail Industrial Multi-family 1 – 3 stories

Email address

Phone number

Irosenow@evergreen-tech.net

360-539-5202

Your name

Your organization

Lisa Rosenow

Other contact name Click here to enter text.

Evergreen Technology Consulting

Economic Impact Data Sheet

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants and businesses.

In service water heating systems, circulation pumps with electronically commutated motors (ECM) offer up to 20% annual energy savings compared to circulation pumps with standard induction motors.

Provide your best estimate of the construction cost (or cost savings) of your code change proposal? (See OFM Life Cycle Cost Analysis tool and Instructions; use these Inputs. Webinars on the tool can be found Here and Here)

\$250 extra incremental cost per pump based on manufacturer data

\$Click here to enter text./square foot (For residential projects, also provide \$Click here to enter text./ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

Office of Financial Management Olympia, Washington - Version: 2020-A Life Cycle Cost Analysis Tool

Executive Report

Project Information					
Project:					
Address:					
Company:	Evergreen Technology Consulting				
Contact:	Duane Lewellen				
Contact Phone:					
Contact Email:	Irosenow@evergreen-tech.net				

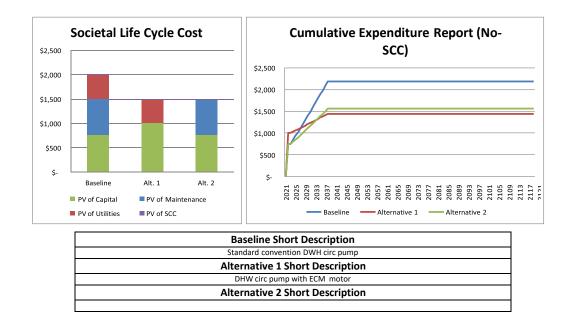
Key Analysis Var	iables	Building Characteristics		
Study Period (years)	17	Gross (Sq.Ft)	0	
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	0	
Maintenance Escalation	1.00%	Space Efficiency		
Zero Year (Current Year)	2021	Project Phase	0	
Construction Years	2	Building Type	0	

Life Cycle Cost Analysis	BEST							
Alternative		Baseline Alt. 1		Alt. 2				
Energy Use Intenstity (kBtu/sq.ft)								
1st Construction Costs	\$	745	\$	993	\$	745		
PV of Capital Costs	\$	745	\$	993	\$	745		
PV of Maintenance Costs	\$	750	\$	-	\$	750		
PV of Utility Costs	\$	585	\$	410	\$	-		
Total Life Cycle Cost (LCC)	\$	2,080	\$	1,403	\$	1,495		
Net Present Savings (NPS)		N/A	\$	677	\$	585		

NPS with SCC	N/A		\$	680	\$	585	
Total LCC with SCC	\$	2,090	\$	1,410	\$	1,505	
Present Social Cost of Carbon (SCC)	\$	10	\$	7	\$	10	
% CO2e Reduction vs. Baseline	N/A	L.		30%		0%	
Tons of CO2e over Study Period		0		0		0	
GHG Impact from Utility Consumption	Baseli	ne		Alt. 1		Alt. 2	
(GHG) Social Life Cycle Cost BEST							
cietal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption							

Warning: OFM Assigned Variables Not Used

MAJOR ERROR ON: Alt. 2



Provide your best estimate of the annual energy savings (or additional energy use) for your code change proposal?

30-50 kWh/gpm/year

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.

Click here to enter text.KWH/ square foot (or) Click here to enter text.KBTU/ square foot

(For residential projects, also provide Click here to enter text.KWH/KBTU / dwelling unit)

Show calculations here, and list sources for energy savings estimates, or attach backup data pages

LCCT for comparison of domestic hot water circulation pump with PSC type motor to pump with 30% more efficient ECM motor. Assume 4000 hrs/yr pump operation B&G Ecocirc pump = 70 watts input Std Motor Pump=100 watts input 2.5 to 5 GPM at 15 ft/hd

30 watts savings X 4000 hrs/yr/1000=120 kWh/yr

List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

No additional enforcement time required.







JOB: REPRESENTATIVE:

UNIT TAG: ORDER NUMBER: DATE: **ENGINEER:** SUBMITTED BY: DATE: CONTRACTOR: APPROVED BY: DATE:



ecocirc® 20-18 | ecocirc+ 20-18

High Efficiency Wet Rotor Circulator with Electronically Commutated Motor (ECM)

DESCRIPTION

The ecocirc 20-18 circulators are designed with a highly efficient electronically commutated permanent magnet motor (ECM Technology).

Cast iron flanged models are designed for closed loop hydronic heating and cooling systems, and stainless steel flanged and union body pumps for plumbing systems or open loop heating and cooling systems.

CONSTRUCTION MATERIALS

Pump Body: Cast Iron or Stainless Steel Impeller: Impact Modified PPE Shaft: Ceramic/Alumina Rotor Can: 316 Stainless Steel

Bearings: Ceramic/Alumina

O-Ring: EPDM

All Other Wetted Parts: 304 or 316 Stainless Steel

Motor Type: Electronically Commutated Permanent Magnet Motor

Insulation Class: F

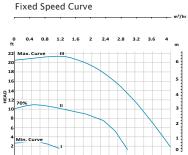
Check Valve: 1" Noryl Check Valve shipped loose for field installation

OPERATING DATA

Maximum Working Pressure: 145 psi (10 Bar) Minimum Working Temperature: 14°F (-10°C) Maximum Working Temperature: 230°F (110°C)

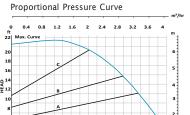
Ambient Temperature Range: 32°F - 104°F (0°C - 40°C)

PERFORMANCE





Constant Pressure Curve



SCHEDULE ecocirc 20-18

CAST IRON BODY (Flanged) STAINLESS STEEL BODY (Flanged and Union)				RATED MOTOR CHARACTERISTICS				
MODEL NUMBER	PART NUMBER	MODEL NUMBER	PART NUMBER	VOLTAGE	PHASE	Hz	WATTS RANGE	AMP RANGE
ecocirc 20-18 flanged	60B0B1000	ecocirc 20-18 stainless steel flanged	60B0B1001	115V	1	50/60	0-70	.06-1.02
		ecocirc 20-18 stainless steel union	60B0B1002	115V	1	50/60	0-70	.06-1.02

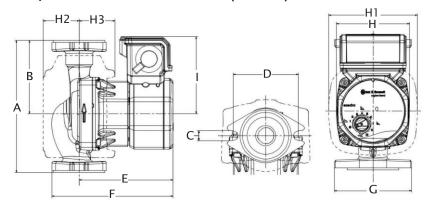
Note: Where potable water is pumped, use a stainless steel circulator. ecocirc 20-18 and ecocirc+ 20-18 circulators are recommended for indoor use only.

SCHEDULE ecocirc+ 20-18

CAST IRON BO	CAST IRON BODY (Flanged) STAINLESS STEEL BODY (Flanged and Union)				RATED MOTOR CHARACTERISTICS				
MODEL NUMBER	PART NUMBER	MODEL NUMBER	PART NUMBER	VOLTAGE	PHASE	Hz	WATTS RANGE	AMP RANGE	
ecocirc+ 20-18 flanged	60B0B1003	ecocirc+ 20-18 stainless steel flanged	60B0B1004	115V	1	50/60	0-70	.06-1.02	
		ecocirc+ 20-18 stainless steel union	60B0B1005	115V	1	50/60	0-70	.06-1.02	

xylem

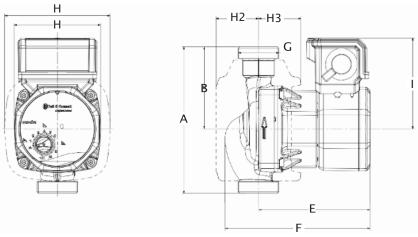
ecocirc/ecocirc+ 20-18 PUMP DIMENSIONS (FLANGED)



		DIMENSIONS – INCHES (mm)									SHIPPING LB. (KG)
MODEL NUMBER	А	В	E	F	н	Н1	H2	НЗ	1	CAST IRON	STAINLESS STEEL
ecocirc 20-18 flanged	6.38" (162)	3.54" (90)	4.57" (116)	5.9" (150)	3.54" (90)	4.29" (109)	1.73" (44)	1.73" (44)	3.74" (95)	6.2 lb. (2.81)	5.86 lb. (2.66)
ecocirc+ 20-18 flanged	6.38" (162)	3.54" (90)	4.57" (116)	5.9" (150)	3.54" (90)	4.29" (109)	1.73" (44)	1.73" (44)	3.74" (95)	6.2 lb. (2.81)	5.86 lb. (2.66)

MACRE MUNAPER	FLANGED # C		DIM	ENSIONS – INCHES (I	mm)	COMPANION FI	ANGE PART NUMBERS
MODEL NUMBER	SIZE INCHES – NPT	BOLTS	С	D	G	CAST IRON PN	STAINLESS STEEL PN
ecocirc 20-18 flanged	3/4", 1", 1-1/4", 1-½"	2	.47" (12)	3.15" (80)	3.74" (95)	101201-101204	101501LF - 101504LF
ecocirc+ 20-18 flanged	3/4", 1", 1-1/4", 1-½"	2	.47" (12)	3.15" (80)	3.74" (95)	101201-101204	101501LF - 101504LF

ecocirc/ecocirc+ 20-18 PUMP DIMENSIONS (UNION)



		DIMENSIONS – INCHES (mm)								APPROX. SHIPPING WEIGHT LB. (KG)	
MODEL NUMBER	Α	В	E	F	н	Н1	Н2	НЗ	_	CAST IRON	STAINLESS STEEL
ecocirc 20-18 union	6" (152.4)	3.36" (85.4)	4.57" (116)	5.9" (150)	3.54" (90)	4.29" (109)	1.73" (44)	1.73" (44)	3.74" (95)	N/A	4.61 lb. (2.09)
ecocirc+ 20-18 union	6" (152)	3.36" (85.4)	4.57" (116)	5.9" (150)	3.54" (90)	4.29" (109)	1.73" (44)	1.73" (44)	3.74" (95)	N/A	4.61 lb. (2.09)

MODEL NUMBER	ODEL NUMBER UNION TAILPIECE SIZE INCHES – NPT		DIMENSIONS -	INCHES (mm)	UNION CONNECTOR KIT PART NUMBERS	
MODEL NUMBER			G	CAST IRON PN	BRONZE PN	
ecocirc 20-18 union	1/2" Sweat, 3/4" Sweat, 3/4" NPT	0	1 1/4" NPSM	N/A	113203LF, 113201LF, 113202LF	
ecocirc+ 20-18 union	½" Sweat, 3/4" Sweat, 3/4" NPT	0	1 1/4" NPSM	N/A	113203LF, 113201LF, 113202LF	

SAFETY STANDARDS AND PROTECTION

Enclosure: Class 1, IP44 (equivalent to NEMA Type 2) UL Listed to UL 778; UL 1004-1, 1004-7; and UL 60730-1

cUL Listed to C22.2 #108

Electronically Thermally Protected (Integrated Motor Protection)

Motor Insulation Class: F

Stainless steel models are NSF/ANSI-61 certified

STANDARD OPERATING MODES



CONSTANT SPEED



The pump maintains a constant speed at any flow rate. The desired speed is set on the interface panel of the pump.

CONSTANT PRESSURE (Δp-c)



The pump maintains a constant differential pressure at any flow demand until the maximum speed is reached. The desired head of the pump can be set via user interface. Recommended for use in systems with small or constant pressure losses.

PROPORTIONAL PRESSURE (Δp-v)



The differential pressure continuously increases or deceases based on the flow demand. The set point head can be set on the pump user interface. Use for systems with large pressure losses.



NIGHT MODE (ecocirc+ 20-18 only)

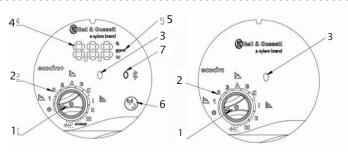
The pump will automatically reduce speed when there is an abrupt change in fluid temperature. The change in fluid temperature is from a boiler operating in night time setback mode. The external temperature sensor is used. (Fixed Speed, Constant Pressure, Proportional Pressure)

INPUT SIGNALS (ecocirc+ 20-18 only)

One 0-10V (Analog): Speed Control by external controller

One external temperature sensor input for temperature modes. Sensor Type: KYT38, P/N: 104502

ONBOARD USER INTERFACE



1	Control mode knob
2	Control mode indicators
3	Status/Fault indicators
4	Numeric display
5	Parameter indicators
6	Control mode button
7	Remote control status indicator

TEMPERATURE DEPENDENT OPERATING MODES (ecocirc+ 20-18 only)

SET POINT TEMPERATURE (Δp-T) (ecocirc+ 20-18 only)



The nominal differential pressure set point is modified based on the fluid temperature. Uses an external temperature sensor.

SET POINT TEMPERATURE (T) (ecocirc+ 20-18 only)



The pump maintains a constant temperature in a system, such as domestic hot water system or a single temperature heating system. Uses an external temperature sensor.

eAdapt (ecocirc+ 20-18 only)

The pump will optimize the energy consumption by identifying the ideal duty point.

←∴ Air Purge

Air purge will remove the dissolved gases from the pump.



www.xylem.com/bellgossett © 2020 Xylem

Bell & Gossett is a trademark of Xylem Inc. or one of its subsidiaries. A-ECO20-18 November 2020